



PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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| Applicant's or agent's file reference IA 814-02WO | FOR FURTHER ACTION See Form PCT/PEA/416 | |
| International application No. PCT/EP2004/011840 | International filing date (day/month/year) 20.10.2004 | Priority date (day/month/year) 24.10.2003 |
| International Patent Classification (IPC) or national classification and IPC H04L12/56, H04B7/26 | | |
| Applicant INTERNATIONAL UNIVERSITY BREMEN GMBH et al. | | |
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 6 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> | | |
| <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p> | | |
| Date of submission of the demand 13.08.2005 | Date of completion of this report 25.11.2005 | |
| Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | Authorized Officer Lombardi, G Telephone No. +49 89 2399-7633  | |

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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-21 as originally filed

Claims, Numbers

1-17 received on 13.08.2005 with letter of 12.08.2005

Drawings, Sheets

1/13-13/13 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
 4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|------|
| Novelty (N) | Yes: Claims | 1-17 |
| | No: Claims | |
| Inventive step (IS) | Yes: Claims | |
| | No: Claims | 1-17 |
| Industrial applicability (IA) | Yes: Claims | 1-17 |
| | No: Claims | |

2. Citations and explanations (Rule 70.7):

see separate sheet

**Concerning section I,
Basis of the report**

1 The following documents are referred to in this communication:

D1: US-A1-2002/0041584

D2: US-A-6400698 B1

**Concerning Section V,
Reasoned statement with regard to novelty, inventive step or industrial applicability**

- 1 Document **D1** discloses, regarding **claim 1**, a communication network comprising a plurality of transmitting stations and receiving stations for transmitting and receiving signals, said transmitting stations being adapted for transmitting a data signal as a series of data packets, wherein a data packet is scheduled to be transmitted by use of an available transmission resource (see D1, page 1, left-hand column, lines 1 to 60 and page 3, left-hand column, lines 1 to 18), and said receiving stations being adapted for transmitting a reservation indicator for reception by transmitting stations, wherein a reservation indicator transmitted by a receiving station carries:
- a first reservation indicator value to indicate that a data transmission resource has been reserved by said receiving station for reception of the next data packet of a data signal from a transmitting station transmitting said data signal (see D1, page 1, left-hand column, line 23 to page 1, right-hand column, line 15; page 5, left-hand column, lines 35 to 44) or
- a second reservation indicator value to indicate that a data transmission resource has not been reserved by said receiving station for reception of the next data packet from said transmitting station or that the last data packet has not been received with acceptable interference from said transmitting station (see D1, page 1, right-hand column, line 39 to page 2, left-hand column, line 15; page 3, right-hand column, lines 8 to 16; page 4, left-hand column, lines 24 to 62).

The difference between D1 and claim 1 consists in that in claim 1 there is provided the additional feature that when a transmitting station receives a reservation indicator carrying a first reservation indicator value transmitted from a receiving station to which no data signal has been transmitted by said transmitting station, which is checked by use of the received signal strength of the reservation indicator or by use of the path gain, said transmitting station will not transmit a data packet by use of the reserved transmission resource.

It would be immediately apparent to the skilled person that the communication network described in D1 has the drawback that, although it prevents a transmitting station intending to communicate with a mobile station to transmit using a transmission resource wherein interference has occurred, it does not prevent other transmitting stations to start transmission using said transmission resource in the case said transmission resource was available to the first transmitting station, thus causing another source of possible interference.

Therefore, the technical problem is considered as how to reduce the interference occurring between transmissions performed by different transmitting stations re-using the same transmission resources.

In consulting the prior art in the general field of mobile communication devices, the skilled person, wishing to find a solution to overcome the above mentioned technical problem, would come across document D2 (see in particular D2, column 2, lines 32 to 46; column 3, lines 22 to 52; column 6, lines 45 to 67 and figure 3) which discloses **the principle**, in a mobile communication system, of transmitting a set of indicator values indicating to other transmitting stations that a shared transmission resource is not available for transmission for said stations.

For the skilled person, therefore, starting from the network described in document D1 and being aware both of the above technical problem and of the **principle** of the solution described in D2, it would be obvious to apply said principle to the network of document D1, in order to arrive at a network wherein the above technical problem has been overcome.

The subject-matter of claim 1, therefore, does not involve the required **inventive step**

according to Article 33(3) PCT.

It should be furthermore noted, at this purpose, that D2 discloses the **principle** of transmitting a signal which can be seen as an equivalent of a "busy-tone" to inform other stations about the non-availability of a transmission resource in order to avoid a source of possible interference respect to other stations which are already using said resource.

It will be then obvious for the skilled man, having in mind the above posed technical problem, to apply said **principle** to the solution of said technical problem, thus arriving to a network corresponding to the one disclosed in claim 1. It is **not** relevant at this purpose the fact that said reservation indicator disclosed in D2 might, in some circumstances, not affect the behaviour of all of the transmitting stations which could be able to receive it, **neither** it is relevant the specific access protocol which is employed in D2.

It should be furthermore noted that a better characterization of the present claim 1 respect to the cited prior art D1 and D2 could be achieved basing on the content of the description, on page 18, lines 1 to 19, wherein it is disclosed that
- transmitting stations receiving a reservation indicator carrying a first reservation indicator value transmitted from a receiving station to which no data signal has been transmitted by them are arranged to not transmit a data packet by use of the reserved transmission resource, wherein said transmitting stations are adapted to detect said reservation indicator according to its signal strength and the path gain so that a transmitting station is adapted to not transmit data only in the case in which its own transmit power will cause an interference at a receiver which is higher than a predetermined threshold".

It is worth noting at this purpose that simply stating that the reservation indicator is "checked by use of the received signal strength of the reservation indicator or by use of the path gain", as in present claim 1, is not sufficient at this purpose, because such a statement only express the obvious fact that the detection of any signal, and therefore also of any signal carrying a reservation indicator, is based on the signal strength of said signal and a too weak signal cannot be detected.

- 2 Furthermore the same considerations as made in paragraph 1 above regarding claim 1 are in essence also valid for **independent claims 15, 16 and 17** since **claims 15, 16 and 17** are based on the same feature combination as claim 1 in terms of claims relating to a method and to apparatuses, respectively.

The subject-matter of claims **15, 16 and 17** therefore does not involve the required inventive step according to Article 33(3) PCT.

- 3 **Dependent claims 2 to 14** do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to **inventive step**, for the reasons that the subject-matter of said claims is **either disclosed** in documents D1 or D2 (for **claim 2**: see D1, page 3, right column, lines 47 to 63 and claim 1; for **claim 4**: see D2, column 3, line 22 to column 4, line 28 and column 5, lines 40 to 67; for **claim 6**: see D1, page 2, left column, lines 8 to 15; for **claims 10 and 11**: see D1, claim 1 and figure 1) or represents simple design details which are generally known to the person skilled in the field of mobile telecommunication devices and related resources management techniques.

- 4 **Remarks concerning clarity of the international application:**

- The independent **claims 1, 15, 16 and 17** refer to "wherein transmitting stations receiving a reservation indicator carrying a first reservation indicator value transmitted from a receiving station to which no data signal has been transmitted by them, which is checked by use of the received signal strength of the reservation indicator or by use of the path gain, said transmitting station will not transmit a data packet by use of the reserved transmission resource".

This expression is ambiguous as several possible interpretations can be given to it, eg. that a reservation indicator is checked only if its signal strength is enough or that the decision whether the reservation indicator should be detected depends on a more complex algorithm taking into account the received signal strength and/or the path gain.

Anyhow it appears from the description, (see page 18, lines 1 to 19), that

transmitting stations receiving a reservation indicator carrying a first reservation indicator value transmitted **from a receiving station to which no data signal has been transmitted by them** are arranged to not transmit a data packet by use of the reserved transmission resource, wherein said transmitting stations are adapted to detect said reservation indicator according to its signal strength and the path gain so that a transmitting station is adapted to not transmit data only in the case in which its own transmit power will cause an interference at a receiver which is higher than a predetermined threshold".

Said claims are thus unclear and not supported by the description as required by Article 6 PCT, as their scope is broader than justified by the description and drawings.

They thus do not meet the requirements of Article 6 PCT.

- The independent **claims 1, 16 and 17** do not meet the requirements of Article 6 PCT for the following reason:

Said claims refer to **systems/apparatuses**, but some of their features relate to a **method** of using the apparatuses/systems rather than clearly defining the apparatuses/systems in terms of their technical features(eg. "wherein transmitting stations.....**will not transmit**"; "a reservation indicator....**which is checked by use** of the received signal strength").

The intended limitations are therefore not clear from these claims, contrary to the requirements of Article 6 PCT.

5 **Remarks concerning formal defects of the international application:**

- Contrary to the requirements of Rule 6.2 b) PCT the features cited in the independent claims are not provided with **reference signs** in parentheses to increase the intelligibility of the claims.

Bremen, 12 August 2005

Our Ref.: IA 814-02WO STK/mie
Direct Dial: 0421/36 35 694

Applicant: INTERNATIONAL UNIVERSITY BREMEN
Serial Number: PCT/EP2004/011840

New Claims (marked-up copy)

1. A communications network comprising
a plurality of transmitting stations and receiving stations for transmitting and receiving signals, said transmitting stations being adapted for transmitting a data signal as a series of data packets, wherein a data packet is scheduled to be transmitted by use of an available transmission resource, and said receiving stations being adapted for transmitting a reservation indicator for reception by transmitting stations,
wherein a said reservation indicator transmitted by a receiving station carries
 - a first reservation indicator value to indicate that a data transmission resource has been reserved by said receiving station for reception of the next data packet of a data signal from a transmitting station transmitting said data signal or
 - a second reservation indicator value to indicate that a data transmission resource has not been reserved by said receiving station for reception of the next data packet from said transmitting station or that the last data packet has not been received with acceptable interference from said transmitting station, and
wherein transmitting stations receiving a reservation indicator carrying a first reservation indicator value transmitted from a receiving station to which no data signal has been transmitted by them, which is checked by use of the received signal strength of the reservation indicator or by use of the path gain, will not transmit a data packet by use of the reserved transmission resource.

2. A communications network as claimed in claim 1,
wherein each data packet is transmitted in a fixed data time slot within a time frame,
wherein indicator time slots are assigned to said data time slots, and
wherein a reservation indicator transmitted in an indicator time slot indicates if the associated data time slot has been reserved in the subsequent time frame for transmission of the next data packet by said transmitting station.

3. A communications network as claimed in claim 1,
wherein said data packets are transmitted in a fixed data sub-carrier,
wherein an indicator sub-carrier is assigned to said data sub-carrier, and
wherein a reservation indicator transmitted in an indicator sub-carrier indicates if the associated data sub-carrier is reserved for transmission of the next data packet by said transmitting station.

4. A communications network as claimed in anyone of the preceding claims,
wherein said first reservation indicator value is represented by transmitting a reservation indicator and wherein said second reservation indicator value is represented by transmitting no reservation indicator.

5. A communications network as claimed in anyone of the preceding claims,
wherein a data transmission resource for the transmission of data packets of a signal is selected based on said reservation indicator.

6. A communications network as claimed in anyone of the preceding claims,
wherein a transmitting station stops the transmission of data packets in the reserved data transmission resource upon receipt of a reservation indicator from the receiving station to which the transmission station transmits data packets, if said received reservation indicator carries a reservation indication value indicating that a data transmission resource has not been reserved by said receiving station for reception of the next data packet from said transmitting station and/or that the last data packet has not been received with acceptable interference from said transmitting station.

7. A communications network as claimed in anyone of the preceding claims, wherein a transmitting station transmits a continue indicator along with a data packet indicating if at least one further data packet shall be transmitted to the receiving station in the same data transmission resource.

8. A communications network as claimed in claim 7, wherein the receiving station, to which the transmitting station transmits a signal, transmits a reservation indicator value indicating that the data transmission resource has been reserved for reception of at least one further data packet if said continue indicator indicates that at least one further data packet shall be transmitted in the same data transmission resource.

9. A communications network as claimed in anyone of the preceding claims, wherein the transmission of a signal from a transmitting station to a receiving station is controlled based on received reservation indicators such that the data packets of the signal are transmitted in data transmission resources that are not reserved by said receiving station or other receiving stations for use by other transmitting stations.

10. A communications network as claimed in anyone of the preceding claims, wherein said data transmission resource is a data time slot, a data sub-carrier, a data carrier and/or a data code.

11. A communications network as claimed in anyone of the preceding claims, wherein said network is a cellular communications network, an ad-hoc communications network or a hybrid cellular/ad-hoc communications network.

12. A communications network as claimed in anyone of the preceding claims, wherein said transmitting stations are adapted for checking if a received reservation indicator is a valid reservation indicator.

13. A communications network as claimed in claim 12, wherein said transmitting stations are adapted for checking the validity of a received reservation indicator by determining the actual path gain for said received reservation indicator and by comparing it to the expected path gain.

14. A communications network as claimed in claim 13, wherein said transmitting stations are adapted for judging a received reservation indicator as invalid if the actual path gain is substantially different from the expected path gain, in particular if the percentage error between the actual path gain and the expected path gain is larger than a predetermined threshold, in particular larger than 5%.

15. A method of communicating in a communications network comprising a plurality of transmitting stations and receiving stations for transmitting and receiving signals comprising the steps of:

transmitting a data signal as a series of data packets by said transmitting stations, wherein a data packet is scheduled to be transmitted by use of an available transmission resource, and

transmitting a reservation indicator for reception by transmitting stations by said receiving stations,

wherein said reservation indicator carries

- a first reservation indicator value to indicate that a data transmission resource has been reserved by a receiving station for reception of the next data packet of a data signal from a transmitting station transmitting said data signal or

- a second reservation indicator value to indicate that a data transmission resource has not been reserved by said receiving station for reception of the next data packet from said transmitting station or that the last data packet has not been received with acceptable interference from said transmitting station, and

wherein transmitting stations receiving a reservation indicator carrying a first reservation indicator value transmitted from a receiving station to which no data signal has been transmitted by them, which is checked by use of the received signal strength of the reservation indicator or by use of the path gain, will not transmit a data packet by use of the reserved transmission resource.

16. A receiving station for use in a communications network comprising a plurality of transmitting stations and receiving stations for transmitting and receiving signals, comprising:

receiving means for receiving a series of data packets of a data signal from a transmitting station, wherein a data packet is scheduled to be transmitted by use of an available transmission resource, and

transmitting means for transmitting a reservation indicator for reception by transmitting stations,

wherein said reservation indicator carries

- a first reservation indicator value to indicate that a data transmission resource has been reserved by said receiving station for reception of the next data packet of a data signal from a transmitting station transmitting said data signal or

- a second reservation indicator value to indicate that a data transmission resource has not been reserved by said receiving station for reception of the next data packet from said transmitting station or that the last data packet has not been received with acceptable interference from said transmitting station, and wherein transmitting stations receiving a reservation indicator carrying a first reservation indicator value transmitted from said receiving station to which no data signal has been transmitted by them, which is checked by use of the received signal strength of the reservation indicator or by use of the path gain, will not transmit a data packet by use of the reserved transmission resource.

17. A transmitting station for use in a communications network comprising a plurality of transmitting stations and receiving stations for transmitting and receiving signals, comprising:

transmitting means for transmitting a series of data packets of a data signal to a receiving station, wherein a data packet is scheduled to be transmitted by use of an available transmission resource,

receiving means for receiving a reservation indicator transmitted from said receiving station,

wherein said reservation indicator carries

- a first reservation indicator value to indicate that a data transmission resource has been reserved by said receiving station for reception of the next data packet of a data signal from said transmitting station transmitting said data signal or

- a second reservation indicator value to indicate that a data transmission resource has not been reserved by said receiving station for reception of the next data packet from said transmitting station or that the last data packet has not been received with acceptable interference from said transmitting station, and a control means for controlling the transmitting means such that upon receipt of a reservation indicator carrying a first reservation indicator value transmitted from a

receiving station to which no data signal has been transmitted by said transmitting station, which is checked by use of the received signal strength of the reservation indicator or by use of the path gain, a data packet will not be transmitted by use of the reserved transmission resource.